

## **What is claimed is:**

**[Claim 1]** An automotive center stack panel assembly comprising:  
an instrument panel face plate having an outer face plate surface and an internal face plate surface;  
a display window region formed into said instrument panel face plate, said display window region having a curved internal window surface;  
a flat flex circuit assembly in direct contact with said curved internal window surface, said flat flex circuit assembly including a plurality of field effect sensors;  
a clamp plate backer mounted to said internal face plate surface;  
a soft durometer backer positioned between said clamp plate backer and said flat flex circuit assembly, said clamp plate backer compressing said soft durometer backer such that said soft durometer backer presses said field effect sensors into direct contact with said curved internal window surface without adhesives.

**[Claim 2]** An automotive center stack panel assembly as described in claim 1, wherein said soft durometer backer is mounted to said clamp plate backer through an adhesive layer.

**[Claim 3]** An automotive center stack panel assembly as described in claim 1, wherein said soft durometer backer is molecularly bonded to said clamp plate backer.

**[Claim 4]** An automotive center stack panel assembly as described in claim 1, further comprising:

at least one structural protrusion formed on said internal face plate surface; and  
a guide slot formed through said flat flex circuit assembly, said guide slot having a guide slot profile configured to match said at least one structural protrusion such that said flat flex circuit assembly is precisely located against said curved internal window surface.

**[Claim 5]** An automotive center stack panel assembly as described in claim 1, further comprising:

a main back grid support mounted to said internal face plate surface, said clamp plate backer positioned between said internal face plate surface and said main back grid support..

**[Claim 6]** An automotive center stack panel assembly as described in claim 1, wherein said soft durometer backer comprises:

a soft durometer panel; and  
a plurality of soft durometer protrusions extending upward from said soft durometer panel, each of said plurality of soft durometer protrusions corresponding to one of said plurality of field effect sensors.

**[Claim 7]** An automotive center stack panel assembly as described in claim 6, wherein each of said soft durometer protrusions is shaped to match the corresponding one of said plurality of field effect sensors.

**[Claim 8]** An automotive center stack panel assembly as described in claim 1, wherein soft durometer backer comprises a backer engagement surface in contact with said flat flex circuit assembly, said backer engagement surface molded to match said curved internal window surface.

**[Claim 9]** An automotive center stack panel assembly as described in claim 1, further comprising:

an audio transducer mounted to said clamp plate backer, said audio transducer providing tactile feedback from activation of one of said field effect sensors.

**[Claim 10]** An automotive center stack panel assembly as described in claim 1, further comprising:

an appliqué element applied to said display window, said appliqué providing operator controls corresponding to said field effect sensors.

**[Claim 11]** An automotive center stack panel assembly comprising:

an instrument panel face plate having an outer face plate surface and an internal face plate surface;

a display window region formed into said instrument panel face plate, said display window region having an internal window surface;

a flat flex circuit assembly in direct contact with said internal window surface, said flat flex circuit assembly including a plurality of contact-less sensors;

a clamp element mounted to said internal face plate surface;

a soft durometer backer positioned between said clamp element and said flat flex circuit assembly, said clamp element compressing said soft durometer backer such that said soft durometer backer presses said contact-less sensors into direct contact with said internal window surface without adhesives.

**[Claim 12]** An automotive center stack panel assembly as described in claim 11, wherein clamp element comprises a clamp plate backer.

**[Claim 13]** An automotive center stack panel assembly as described in claim 11, wherein said clamp element comprises a main back grid support.

**[Claim 14]** An automotive center stack panel assembly as described in claim 11, wherein said contact-less sensors comprise field-effect sensors.

**[Claim 15]** An automotive center stack panel assembly as described in claim 11, wherein said contact-less sensors comprise capacitance sensors.

**[Claim 16]** An automotive center stack panel assembly as described in claim 11, further comprising:

at least one structural protrusion formed on said internal face plate surface; and  
a guide slot formed through said flat flex circuit assembly, said guide slot having a guide slot profile configured to match said at least one structural protrusion such that said flat flex circuit assembly is precisely located against said internal window surface.

**[Claim 17]** An automotive center stack panel assembly as described in claim 11, wherein said soft durometer backer comprises:

a soft durometer panel; and  
a plurality of soft durometer protrusions extending upward from said soft durometer panel, each of said plurality of soft durometer protrusions corresponding to one of said plurality of field effect sensors.

**[Claim 18]** An automotive center stack panel assembly as described in claim 11, wherein soft durometer backer comprises a backer engagement surface in contact with said flat flex circuit assembly, said backer engagement surface molded to match said internal window surface.

**[Claim 19]** A method of manufacturing an automotive center stack panel assembly comprising:

placing a flat flex circuit assembly onto an internal window surface of an instrument panel face plate, said flat flex circuit assembly including a plurality of contact-less sensors;

placing a clamping assembly over said flat flex circuit assembly such that said flat flex circuit assembly is positioned between said internal window surface and said clamping assembly, said clamping assembly comprising a clamp element and a soft durometer backer positioned between said clamp element and said flat flex circuit assembly; and

mounting said clamp element to said internal window surface such that said clamp element compresses said soft durometer backer such that said soft durometer backer presses said contact-less sensors into direct contact with said internal window surface without adhesives.

**[Claim 20]** A method as described in claim 19, further comprising;

molding said soft durometer backer such that soft durometer backer includes a backer engagement surface configured to match said internal window surface.